Cetaqua Annual Report

CETAQUA
WATER TECHNOLOGY CENTRE

2024

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Opening remarks

Opening remarks

I am proud to present Cetaqua–Water Technology Centre's annual report for 2024, a key year in which we took significant steps towards consolidating our position as a benchmark in innovation in the complete water cycle and sustainability.

Our mission – to transform scientific and technological knowledge into real solutions that generate a positive impact on the territories, and thus ensure our readiness to tackle the major challenges facing water and environmental management – has become more meaningful than ever, given an environmental, economic and social context that requires us to redouble our efforts.

Currently, the Cetaqua model involves coordinated implementation through the activity of our connected network of centres in Barcelona, Andalusia, Galicia and Chile, and in delegations such as the one recently created in the Valencian Community. This territorial distribution means we understand and can respond to different local realities, backed up by our pioneering public-private collaboration model, generating synergies and spaces of trust and excellence with our partners, clients and strategic allies.

Among the most relevant milestones during the year, I would like to highlight the progress in the advanced aquifer management programme. Together with Aigües de Barcelona, we initiated recharge with reclaimed water in the Sant Vicenç dels Horts (Barcelona) reservoirs as part of the MARCLAIMED project, thus increasing local water resilience. This project has also been replicated on the Costa del Sol, where a reclaimed water recharge pilot plant is being built as part of the MATRIX project.

We also advanced in the programme focused on promoting reuse and other water resources, where we made progress in implementing the fertigation model to make use of nutrients present in reclaimed water. Along these lines, the LIFE Conquer project, in conjunction with Aguas de Murcia, was completed with the production of reclaimed water for irrigating areas of greenery and the demonstration of a membrane-based technology to be put into operation in Murcia. At the same time, in collaboration with Veolia, Hidralia and the Andalusian Institute for Agricultural, Fisheries, Food and Organic Production Research and Training (IFAPA), construction of the Nutriloop project plant was completed, its purpose being to demonstrate fertigation at the Roquetas de Mar wastewater treatment plant (Almería) with local farmers.

Moving forward in the field of reuse, in 2024, Purifying, a pioneering international project, began in Chile to demonstrate direct drinking water reuse in one of the Aguas Andinas plants. This scheme will also be demonstrated in 2025 in Barcelona, with Aigües de Barcelona and the Catalan Water Agency (ACA).

In addition, we initiated new public financing projects that allow us to: develop digital twin models for inland waters; analyse how nature-based solutions (NBS) can help manage extreme events such as floods; explore new technologies to increase co-digestion processes; and study how to combat antibiotic resistance in wastewater from hospitals and healthcare centres.

ALBERTO SÁNCHEZ
Director of Innovation at Veolia Spain and General Manager of Cetaqua–Water Technology Centre

Our mission has never been more meaningful, in an environmental, economic and social context that demands we redouble our efforts.

We are also deeply committed to technology transfer: we want to ensure innovation is not confined to laboratories and proofs of concept, but instead reaches those who manage the resource on a daily basis. Consequently, we transfer research results and tangible, robust, applicable and scalable solutions to the operators and companies we work with.

All this is the clear result of our commitment to transformative innovation capable of redefining water management and recovery to ensure a sustainable, efficient and fair complete water cycle for people and the planet.

But none of this would be possible without the effort, excellence and commitment of the people who are part of Cetaqua. Please preserve that transcendent motivation that gives meaning to all this. And, of course, thanks also to our trustees, partners and clients who, over nearly 20 years of joint experience, have shown their unceasing trust in our ability to innovate and meet the water challenges of today and tomorrow. Your commitment to innovation as a driver for transformation is the best way to keep moving forward and ensure a sustainable future for water.

The commitment to innovation as a driver for transformation is the best way to continue advancing and ensuring a sustainable future for water.

02

Cetaqua– Water Technology Centre

2.1. We are Cetaqua

We are Cetaqua, a network of water technology centres specialised in water, based on a unique public-private partnership model.

We develop innovative solutions that guarantee sustainability and efficiency in all stages of the complete water cycle. As we are always connected to the regions, we understand local needs when addressing present and future global challenges. In doing so, we ensure sustainable economic, environmental and social development.

Our activity focuses on the following strategic areas of innovation:

Resource planning and management

Production and new resources

Zero waste and decarbonisation

Territorial and social sustainability

Digital services and AI applications

2.2. Our mission, vision and values

We turn ideas into transformative realities that generate a positive impact in the regions where we operate.

We innovate to address water-related challenges and make territories more resilient to climate change. In this sense, we are firm in our purpose: **to protect and preserve one of our planet's most valuable natural resources – water**.

With this objective in mind, we place science-based technological development and RDI at the service of people. We establish alliances with public and private organisations, helping them to become more competitive through innovative, effective and sustainable solutions that facilitate the responsible, efficient use of water.

Our efforts are focused on:

Driving continuous innovation

In the development of advanced solutions that address the challenges of the water cycle.

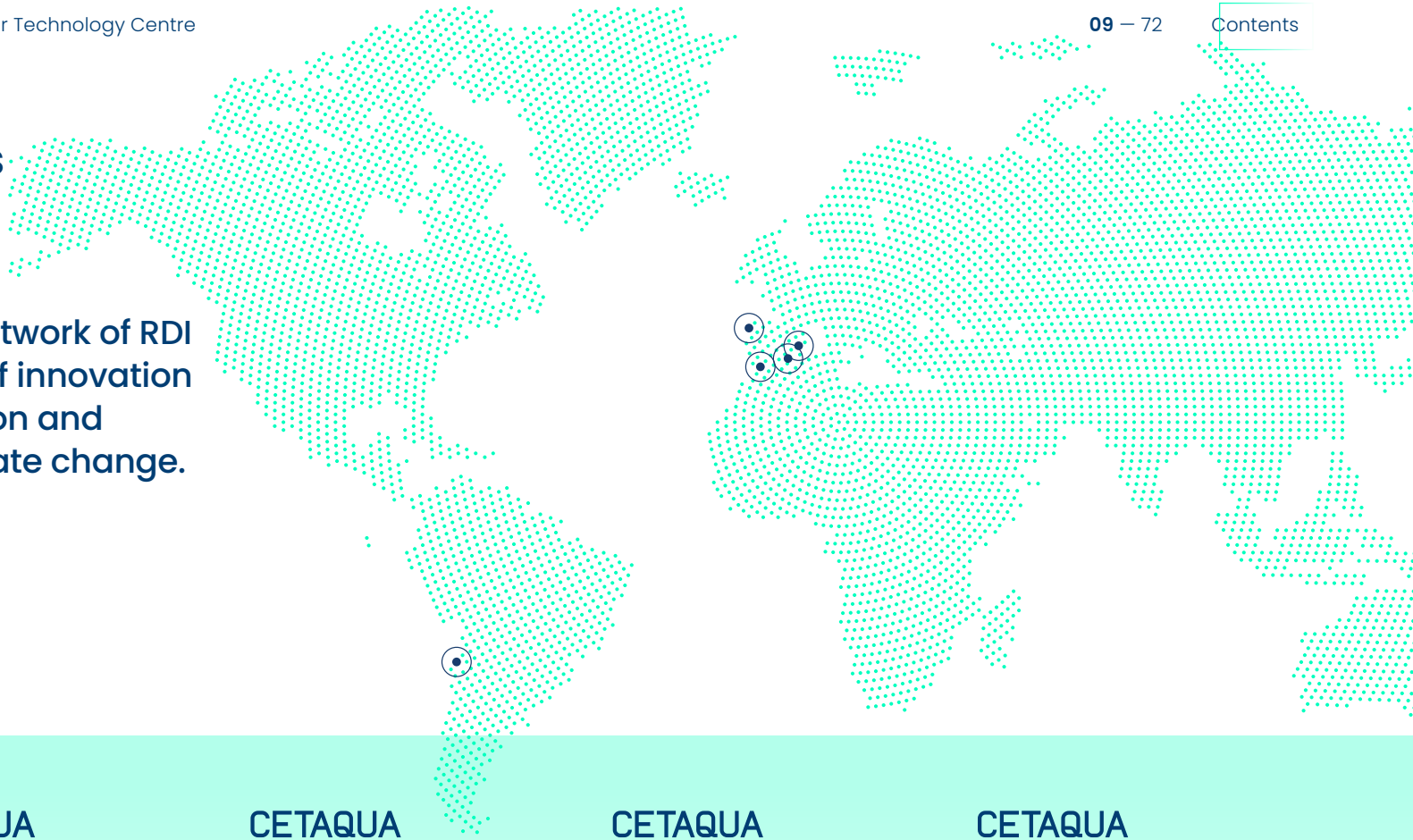
Fostering collaboration

With the public and private sector, involving key stakeholders in regional ecosystems to maximise social impact.

Guaranteeing operational excellence

In all our actions, thereby consolidating our position as an international benchmark in technologies applied to water and the environment.

2.3. Network of centres



We are an interconnected network of RDI centres at the cutting edge of innovation that seeks to foster adaptation and strengthen resilience to climate change.

CETAQUA BARCELONA

It was created in 2007 through a partnership involving Aigües de Barcelona, the Universitat Politècnica de Catalunya-Barcelona Tech (UPC) and the Spanish National Research Council (CSIC). The success of this model has led to its expansion and replication in other centres.

CETAQUA GALICIA

It was founded in 2011 by Viaqua, the University of Santiago de Compostela and the CSIC. The centre was acknowledged by the Government of Spain as the first to focus exclusively on water and the environment and it is the only Technology Innovation Support Centre (CAIT) in Santiago de Compostela.

CETAQUA ANDALUCÍA

It opened in 2014 thanks to the collaboration of Hidralia, the Universidad de Málaga (UMA) and the CSIC. It is dedicated to the efficient management of water resources, with special attention to groundwater, and applies state-of-the-art digital technologies to the management of the complete water cycle.

CETAQUA CHILE

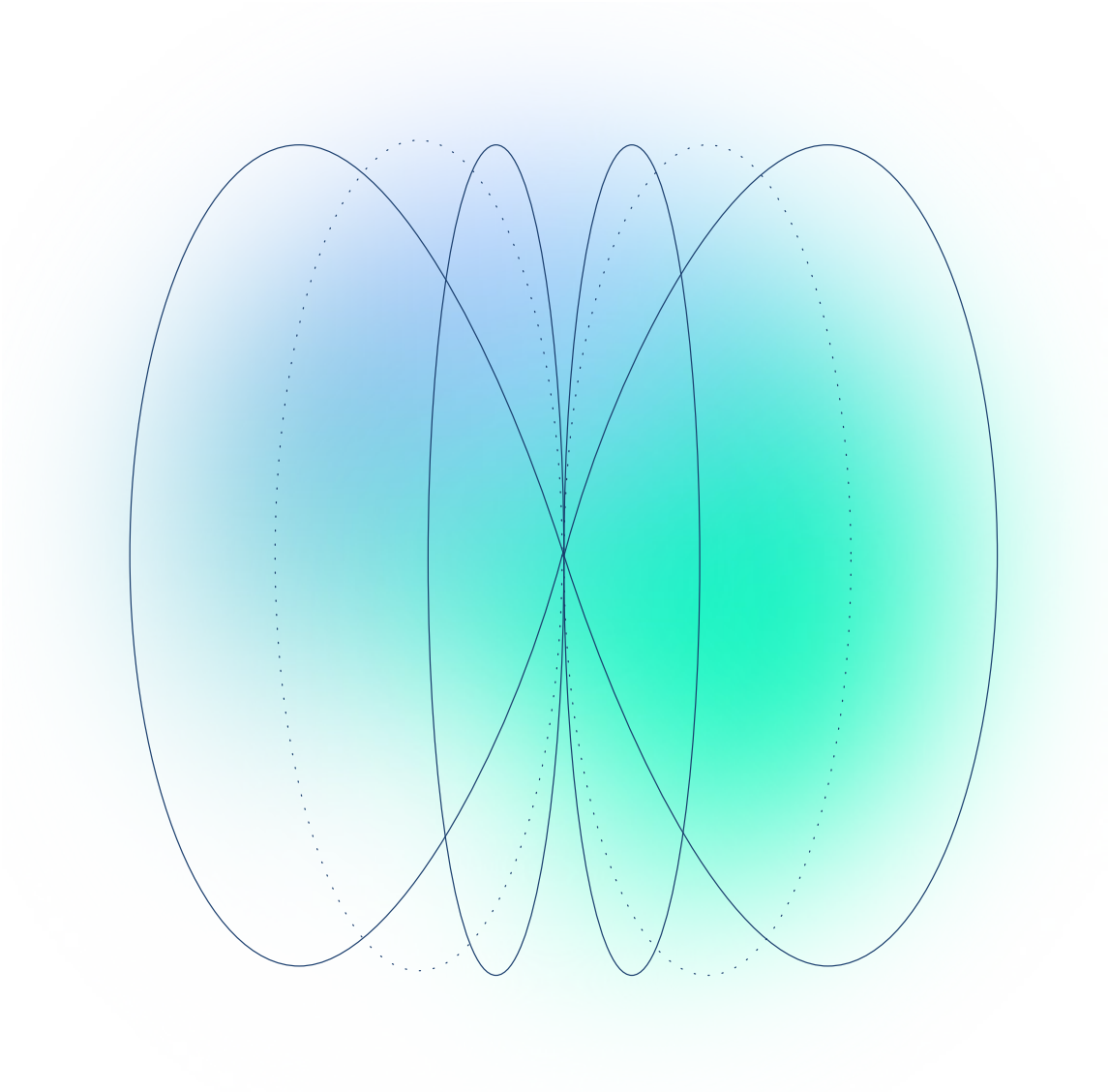
Founded in 2015 by Veolia Chile, Aguas Andinas, the Federico Santa María Technical University (USM) and the CSIC. Its main objective is to drive the country's ecological transition through four key areas of research.

CETAQUA COMUNITAT VALENCIANA

Delegation in the Valencian Community: set up in 2024 through an alliance with Hidraqua. Its objective is to position the region at the cutting edge of innovation, with a special focus on the development of digital solutions.

2.4. Pioneering partnership model

We conduct our activity through a pioneering public-private partnership model. This consolidates our position as a leading technology centre, renowned for our operational excellence and ability to meet local needs effectively.



We establish alliances with scientific and technical experts, professional associations, companies and public bodies, creating spaces of trust and excellence that act as catalysts for innovation.

Working with this approach allows us to develop effective and sustainable long-term solutions that improve efficiency in water use, promote water reuse and ensure integrated management of the resource, thus addressing the current and future challenges regarding water that affect us globally.

2.4. Pioneering partnership model

Strategic alliances

We rely on key players in regional ecosystems and European leaders to offer solutions that promote sustainable, economically viable and social welfare-oriented development.

Scientific-Technical Council

This advisory body guides innovation policies and identifies funding opportunities and development programmes, while proposing new lines of work and assessing emerging business needs.

Board of Trustees

This is our main governing body, made up of representatives from our founding organisations.

→ See trustees

Mixed model

We are structured in a network that connects four independent centres and a branch office, all working closely together. Each centre operates under a public-private cooperation scheme with universities, companies and leading organisation in the region.

CETAQUA BARCELONA

CETAQUA GALICIA

CETAQUA ANDALUCÍA

CETAQUA CHILE

CETAQUA COMUNITAT VALENCIANA

2.5. Our governing body

Trustees

CETAQUA BARCELONA

Chairman
Manuel Cermerón / Veolia Spain

Vice-Chairman
Daniel Crespo / UPC

Non-trustee Secretary
Fernando Tallarico / Veolia Spain

Members
Carlos Closa / CSIC
Alberto Sánchez / Veolia Spain

CETAQUA GALICIA

Chairman
Javier Díez / Veolia Spain

Vice-Chairwoman
Ana Tejeiro / Viaqua

Non-Trustee Secretary
María Teresa Abalde / Viaqua

Members
Alberto Sánchez / Veolia Spain
Catalina Balseiro / Veolia Spain
Carlos Closa / CSIC
Antonio López / USC

CETAQUA ANDALUCÍA

Chairman
Marcos Martín / Hidralia

Vice-Chairman
José Ángel Narvaez / UMA

Non-Trustee Secretary
Teresa Vizcaíno / Veolia Spain

Non-Trustee Vice-Secretary
Jorge Palomino / Hidralia

Members
Alberto Sánchez / Veolia Spain
Carlos Closa / CSIC
Ernesto Sánchez / Hidralia

CETAQUA CHILE

Chairman
Joaquim Martí / Veolia Chile

Vice-Chairman
Juan Yuz / USM

Non-Trustee Secretary
M. Angélica Rivera / Veolia Chile

Directors
Xavier Iraegui / Aguas Andinas
Diego Olivares/ Aguas Andinas
Edson Landeros /Aguas Andinas
Francisco Javier Moreno / CSIC
Claudio Acuña / USM
Erlik Muñoz / Veolia Chile

Members
Alberto Sánchez / Veolia Spain

Words from our managers

"Cetaqua Barcelona continues to strengthen its role as a hub of applied innovation, closely connected to the regional ecosystem. We serve as a bridge between knowledge and practice, strengthening collaboration with government authorities, operators and other key stakeholders to transform current and future water challenges into shared opportunities and sustainable solutions with real impact."

Marina Arnaldos, manager at Cetaqua Barcelona

"At Cetaqua Galicia we address the challenges of climate change and growing pressure on resources by promoting ecological and digital transformation in the water cycle. In alliance with key players in the region, we work to convert wastewater treatment plants into ecofactories, promoting the circular economy, resource recovery and decarbonisation. Examples of this include CIGAT Circular and RUAGUA."

Teresa Alvariño, manager at Cetaqua Galicia

"Cetaqua Andalusia promotes solutions that strengthen water resilience in regions most exposed to the effects of climate change. We take a comprehensive approach that combines technological innovation, digitalisation and recovery of non-conventional resources. To do this, we building strong public-private partnerships to take research into the field and develop more sustainable and efficient management models tailored to the most urgent regional needs."

Enrique Gutiérrez, manager at Cetaqua Andalusia

"Water stress in Chile has become a structural threat. Given this scenario, Cetaqua Chile focuses on rethinking how water is managed, developing effective solutions through collaborative projects and partnerships with the productive sector. We work to incorporate reuse, digitisation and resource recovery as pillars of a new water culture, one that is more resilient, fairer and adapted to the challenges facing the country."

Javier Rivera, manager at Cetaqua Chile

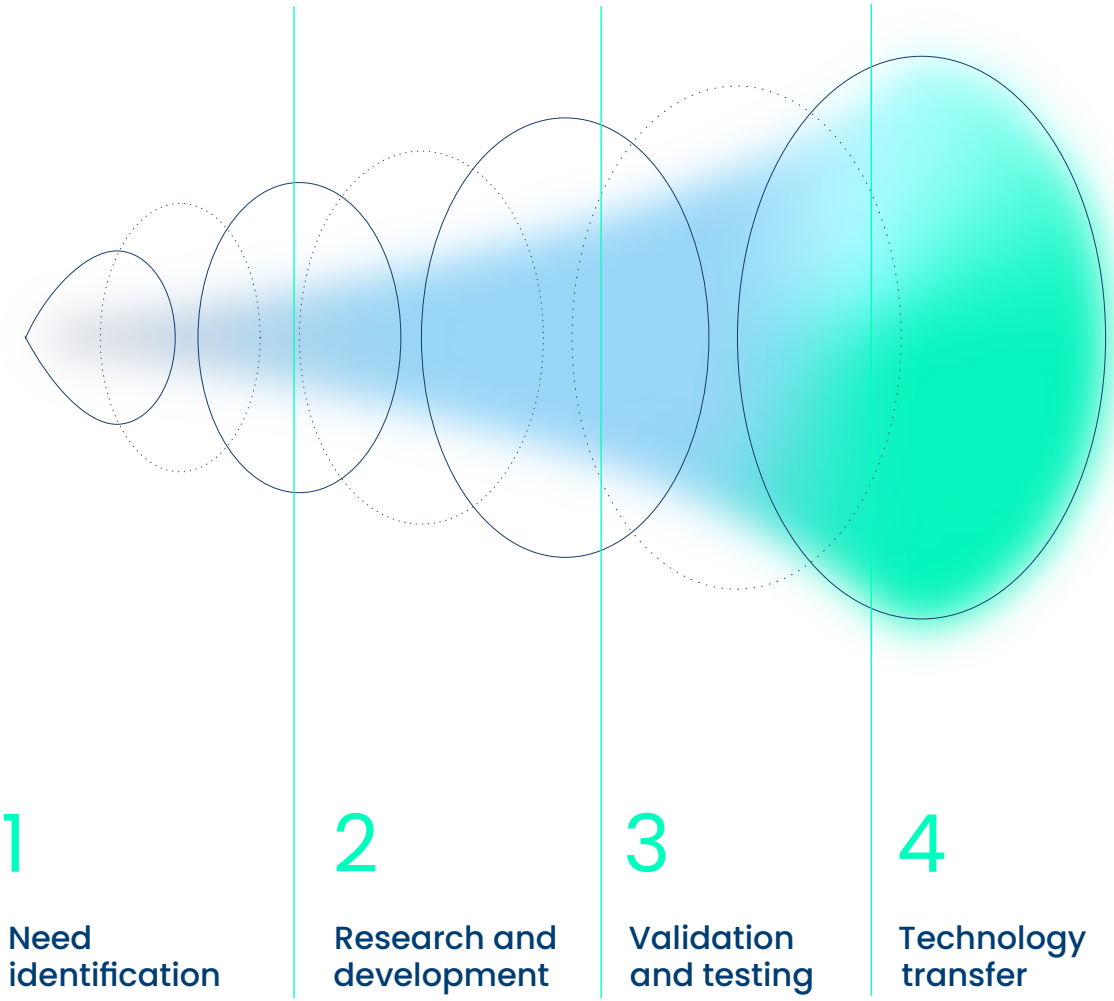
03

Our innovation strategy

3.1. Innovation strategy

Our methodology covers the entire innovation process: from detecting environmental needs and opportunities to generating scientific knowledge which is turned into practical solutions.

Through our activity, we develop and implement tangible, robust, applicable and scalable solutions that cover the complete water cycle, ranging from innovative business models to revolutionary products, from advanced services to improvements in the management of water resources.



1 Need identification

We work closely with water operators, government authorities, different production sectors and stakeholders to identify their specific needs. We use this information to design the roadmap that guides our different areas of innovation.

We take two main approaches to meet current challenges:

- Generating and promoting new ideas or concepts
- Actively searching for solutions through technology scouting, adapting options already available on the market. We assess the robustness of these technologies and their potential for implementation in the industry, ensuring our decisions are effective

+300 companies

+50 government authorities

+150 universities and research centres

+50 scientific associations

2 Research and development

We are leaders in developing and executing RDI projects. We generate scientific knowledge that we apply to the field of water and the environment with the aim of promoting economic growth and technological development.

We promote open innovation by collaborating with start-ups, other technology centres and leading universities. This cooperation gives us first-hand knowledge of emerging technologies and allows us to work together in developing innovative solutions.

Ongoing public financing projects:

26
Horizon Europe projects

11
LIFE projects

3 Validation and testing

Our experimental platforms, such as laboratories and pilot plants, allow us to apply the results obtained from our research in real environments.

We also carry out proof-of-concept tests to verify that the technologies work correctly and perform as expected.

4 Technology transfer

The end goal of our activity is to transfer the knowledge generated throughout the RDI process and promote application of the results.

This transfer takes the form of creating new business models, innovative digital solutions and operational improvements that contribute to economic development and have a positive impact on the planet and people's quality of life.

04

Our areas of innovation

4.1. Areas of innovation

We focus on five strategic areas of innovation designed to meet the needs of companies and regions, tackling current challenges in society and directly benefiting people and the environment.

Our areas of innovation are aligned with the United Nations Sustainable Development Goals:

- Resource planning and management
- Production and new resources
- Zero waste and decarbonisation
- Territorial and social sustainability
- Digital services and AI applications

Area 1. Resource planning and management

We provide comprehensive resource management to ensure water security.

Our mission is to strengthen water security and territorial resilience. To do this, we anticipate water availability and demand by proposing predictive, thorough water management, covering both surface and groundwater.

We achieve this objective by implementing innovative tools such as aquifer recharge with non-conventional resources and models for climate adaptation.

In this area of innovation, we have developed several programmes that allow us to:

- **Increase water security** through optimised water resource planning in urban and agricultural areas
- **Optimise advanced aquifer management**
- **Increase resilience** to extreme weather events

Area 2. Production and new resources

We ensure territorial water security and promote resource recovery.

We develop safe, innovative solutions for drinking water purification, wastewater reclamation and seawater desalination processes. Through these initiatives, we maximise the quantity and quality of available water resources.

In this area, we promote programmes that allow us to:

- Guarantee the supply of **drinking water**
- Promote the **reuse** and the use of **alternative water resources**
- Drive environmental solutions for industry in order to **increase resilience**

Area 3. Zero waste and decarbonisation

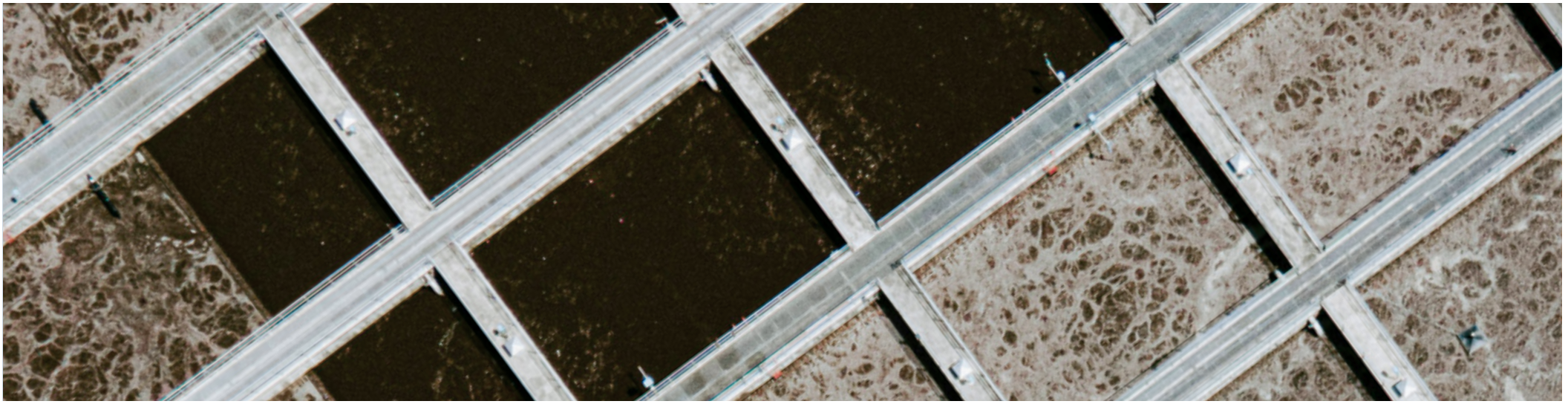
We promote efficiency in wastewater treatment, energy self-sufficiency and resource recovery.

We develop and validate innovative processes that improve the efficiency and sustainability of wastewater treatment plants, minimise operational risks, generate green energy and reduce the carbon footprint. We also work on the recovery of high-value by-products.

Our approach ensures the quality of treated effluents, drives decarbonisation in our plants and promotes circular and sustainable business models.

In this area of innovation, we run different programmes that allow us to:

- Provide **advanced wastewater treatments**
- Develop **technologies for decarbonisation and gas recovery**
- **Convert waste into high-value products**, with the goal of achieving zero waste



Area 4. Territorial and social sustainability

We drive forward solutions that ensure sustainable development and improve citizens' well-being.

We develop methodologies, tools, strategies, plans and management models that, when applied to territories and companies, guarantee sustainable development that is environmentally friendly, economically viable and focused on social benefit.

In this area of innovation, we carry out programmes that allow us to:

- Contribute to **environmental neutrality and circularity**
- **Promote the water economy and commitment to social innovation**, involving the general public in the process

Area 5. Digital services and AI applications

We provide digital tools for the roll-out of innovative solutions that transform management of the complete water cycle.

Through advanced technological solutions, we optimise resources, improve operational efficiency and ensure environmental sustainability. We use state-of-the-art technologies, always adapted to the specific needs of each client.

Our approach ranges from understanding problems to assessing requirements, while designing and developing software architectures and transferring solutions for integration into the client's existing systems.

In this area of innovation, we promote programmes that allow us to:

- Offer modelling, simulation or AI solutions to **maximise the performance and lifetime of water infrastructures**
- Transform **data into actionable knowledge** to improve business cycle decision-making and the client experience
- Revolutionise how processes are monitored using **computer vision technologies**
- Integrate cutting-edge technologies to **protect natural resources** and adapt to climate change

05

Innovation infrastructures

5.1. Innovation infrastructures

Technological progress and knowledge implementation are essential to addressing challenges associated with the climate emergency and the resulting issue of water scarcity.

At Cetaqua we promote innovation through our experimental platforms, such as laboratories, pilot plants and prototypes, which allow us to transfer the results of our research projects to applications in real environments.

02
laboratories

39
experimental platforms

670 m²
of dedicated RDI infrastructures

5.2. Laboratories

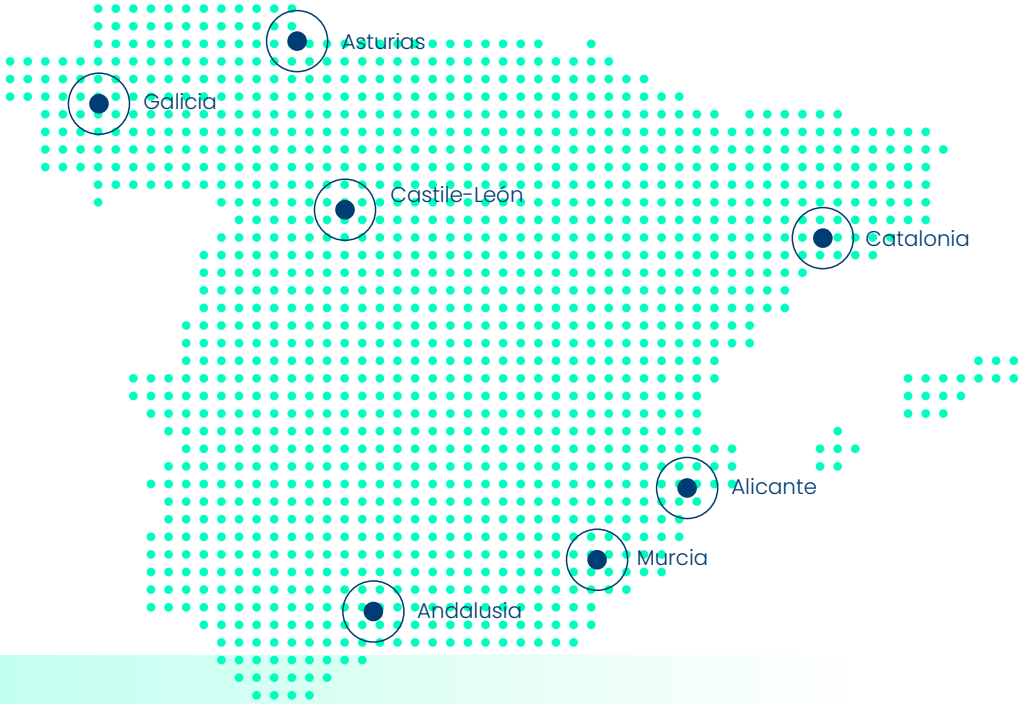
CETAQUA LAB & TECH

With this platform, we offer solutions to improve water quality and optimise efficiency in its treatment.

CIGAT

Here we validate innovative solutions for water purification and waste flow recovery, aimed at obtaining by-products and sustainable energy.

5.3. Pilot plants



Our pilot plants are key spaces in our innovation process. We test and validate, under real conditions, the results of our research in these facilities, prior to full-scale implementation.

Highlighted experimental platform

CIGAT Circular water reclamation plant (WRP)

In 2024, the construction of the reclaimed water production plant at the Ourense wastewater treatment plant (WWTP), managed by Viaqua, was completed. This facility transforms treated water into high-quality reclaimed water, suitable for multiple urban uses such as street cleaning, sewer maintenance and the irrigation of green areas, thus contributing to a circular economy model for water. The project takes into account:

→ Adaptation to local water needs
→ Resource optimisation and cost reduction
→ Commitment to the circular economy

5.4. Cetaqua pilot projects

Alicante

Anaerobic co-digestion pilot projects	Completed	B-WaterSmart project. Rincón de León.	
CEVAP + struvite pilot projects	Completed	B-WaterSmart project. Rincón de León.	
Ammonium salts recovery pilot projects	Completed	B-WaterSmart project. Rincón de León.	

Andalusia

LIVING LAB ZLD and metal recovery in the mining sector	Completed	LIFE REMINE WATER project, SandfireMATSA. Huelva.	→ View virtual tour
Pilot project for the extraction of polyphenols from oil industry waste	In progress	LIFE CYCLOPS project. Borges-BAIEO facilities in Cabra, Córdoba.	→ View virtual tour
Pilot plant for the production of reclaimed water with nutrients	In progress	Nutriloop project. Roquetas de Mar WWTP, Almería.	
Pilot project for the recovery of metals and critical raw materials from water in the mining industry	Completed	REECOVERY project. Minera los Frailes, Aznalcóllar, Seville.	→ View virtual tour
Computer vision pilot project for detecting floating solids	Completed	ZeroVision Roquetas project. La Vela WWPS, Antonio Machado WWPS.	
Computer vision pilot project for detecting sieve relief	Completed	ZeroVision Roquetas project. Felix WWTP.	
Computer vision pilot project for discharge detection in rivers	In progress	EMERITUS project. Guadalhorce River, Málaga.	
Salt precipitation in supply networks pilot project	Completed	PRESS project. Torremolinos, Málaga.	
Pilot project for artificial aquifer recharge with reclaimed water	In progress	LIFE MATRIX project. Marbella.	

Pilot project involving computer vision for foam detection	Completed	ZeroVision project. Roquetas de Mar WWTP.
Computer vision pilot project for the detection of coloured discharges/ sudden colour changes in the WWTP inlet	In progress	ZeroVision project. Biofactoría Sur, Granada.
Computer vision pilot project for the detection of hydrocarbon discharges at the WWTP inlet	In progress	ZeroVision project. Biofactoría Sur, Granada.
Computer vision pilot project for run-off classification at WWTPs	In progress	ZeroVision project. Biofactoría Sur, Granada.
Computer vision pilot project for detecting dirt in screens	In progress	ZeroVision project. Paseo del Salón, Granada.

Castile-León

Full-scale InDense technology	Completed	DENMASS project. Palencia WWTP.

Catalonia

Computer vision for quality centring	Completed	Computer Vision Lab project. Gavà-Viladecans WWTP.	
Computer vision for the detection of blanket breakage in decanter plants	Completed	Computer Vision Lab project. Sant Joan Despí DWTP.	
Computer vision for turbidity classification	In progress	EMERITUS project. Sant Joan Despí DWTP.	→ View virtual tour
Computer vision for foam detection	In progress	CV Espumas Llagosta project. La Llagosta WWTP.	
Biological methanisation pilot	In progress	LIFE NIMBUS project. Baix Llobregat WWTP.	
Ion-exchange metal separation pilot project	In progress	RESiLEX project. Cornellà de Llobregat.	
Biogas and green hydrogen production pilot plant	In progress	BIOPHOTO project. Cornellà de Llobregat.	
Metal precipitation pilot project	In progress	RESiLEX project. Cornellà de Llobregat.	
Hydroponic cultivation with reclaimed water pilot project	Completed	REGREEN project. Cornellà de Llobregat.	

Galicia

VFA and URS organic fraction sludge pilot project	In progress	ECOVAL project, in CIGAT Circular. Santiago de Compostela.	→ View virtual tour
Reclaimed water pilot test	In progress	RUAGUA project. A Rúa.	
AGV purification pilot project	In progress	CIGAT Circular project. Santiago de Compostela.	
Pilot production of medium-chain fatty acids	In progress	CIGAT Circular project. Santiago de Compostela.	
Water reclamation plant	In progress	CIGAT Circular project. Ourense WWTP.	
Smart biofertiliser pilot project	In progress	WaINUT project. Ourense WWTP.	
Biological SBR pilot project 500 L	In progress	PLISAN WWTP. Pontevedra.	
Biological MBBR pilot project 500 L	Completed	Praceres WWTP. Pontevedra.	
Ammonia production pilot project	In progress	CIGAT Circular project. Santiago de Compostela.	

Asturias

Computer vision pilot project for detecting brown foam in the biological reactor	In progress	CV EDAREO project. Eo WWTP.

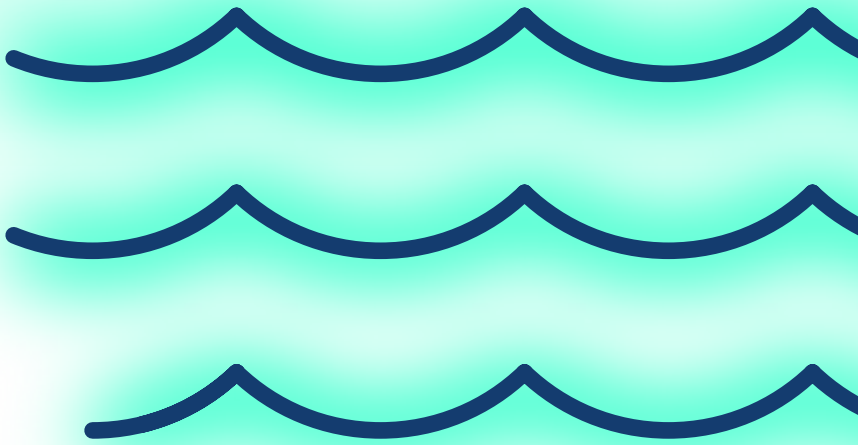
Murcia

NaOCl reuse and production pilot project	Completed	LIFE Conquer project. Zarandona WWTP.	→ View virtual tour
Water reclamation with reused membranes pilot project	In progress	LIFE WARRIOR project. Nueva Sucina WWTP.	

06

Success cases

Area 1. Resource planning and management



A1.1. CARDIMED, climate adaptation and resilience through NBS demonstrated in Mediterranean region

THE CHALLENGE

The CARDIMED project, co-funded by the Horizon Europe programme, aims to create a framework for strengthening resilience to climate change in the Mediterranean region through nature-based solutions (NBS) by coordinating individual and collective efforts in nine countries.

THE SOLUTION

CARDIMED is creating a framework to boost climate resilience in the Mediterranean region through NBS. Nine demonstration cases allow over 20 types of NBS to be tested and assessed using the same planning and evaluation methodology. Special efforts are being made to improve the implementation of NBS through comprehensive planning, which includes social participation, and to improve monitoring of the solutions. In addition, full, comprehensive evaluations of their benefits will also be carried out, involving a thorough list of indicators, including social and environmental aspects.

THE RESULT

Among the different solutions provided by the project, Cetaqua's main focus is on:

→ Creating the NBS Catalogue, providing very precise data on technical, environmental and economic aspects of more than 30 NBS

→ Developing a digital tool to advise government authorities and consulting firms on which NBS to promote and where

→ Implementing and assessing NBS, such as those related to water treatment and flood reduction

"CARDIMED aims to give a new impetus to nature-based solutions (NBS) in Europe, establishing a firm foundation for their implementation in areas where they are most needed, for example, to address new challenges in water treatment and flood management."

LAURENT POUGET Head of the Extreme Events Resilience programme and CARDIMED project manager

PARTNERS: National Technical University of Athens, ICCS, University of Utrecht, BIOAZUL, CORE Innovation Centre, Cetaqua Barcelona, Aquatec, ICLEI - Local Governments for Sustainability, Alchemia-nova Research, LIBRA AI Technologies, ALEA srl, Centro Tecnológico de la Construcción, MedINA, HYDRASPIS, North Aegean Region, Region of South Aegean, Halcor, ITAINNOVA, Region of Central Greece, ReonHydor, Università Politecnica delle Marche, Alma Mater Studiorum - University of Bologna, IRIDRA, Università di Catania, City of Catania, Region of Sicily, SVIMED, SEMIDE, Aix-Marseille Université, EMPAN, Region of Provence-Alpes-Côte d'Azur, CIRCE, Centre Tecnològic BETA, Government of Aragón, University of Évora, Intermunicipal Community of Alentejo Central, eBOS, Gardens of the Future, City of Nicosia, İzmir Institute of Technology, IzBelcom, Izmir Metropolitan Municipality, Doga Dernegi, İZSU, BABEG, SEO/BirdLife, Murcia City Council, Aguas de Murcia, IRENA, City of Alghero, Imperial College London

DURATION: 2023-2028

COORDINATOR: NTUA

MORE INFORMATION: www.cardimed-project.eu

A1.2. MARCLAIMED, managed aquifer recharge with alternative water resources

THE CHALLENGE

MARCLAIMED takes action to address the challenges of integrating managed aquifer recharge with alternative water resources into hydrological and drought plans as a structural measure to mitigate water scarcity in Europe.

THE SOLUTION

Demonstration of digital and innovative tools in three demo locations in Spain, Portugal and the Netherlands. These tools are intended to improve operational efficiency, economic sustainability and social perception of the use of these types of water resources.

THE RESULT

The Integrated Decision Support Tool (IDST) – the main outcome from MARCLAIMED – will provide solutions to address existing and emerging threats, supporting decision-making and climate change adaptation policies.

The project also focuses on social acceptance, involving European Union policymakers through a Community of Practice, to define guidelines and recommendations within the European regulatory framework.

"This project represents a turning point that will provide the necessary foundations for the integration of managed aquifer recharge with alternative water resources as a structural measure in distribution systems, increasing their resilience to the impacts of climate change."

SARA ESPINOSA Head of the Advanced Aquifer Management programme and MARCLAIMED project manager

PARTNERS: Aquatec, Aigües de Barcelona, ACA, LNEC, EGM, USAL, Fresh Thoughts, Acacia Water, IMN, Aguas do Alentejo, WE, Cetaqua Barcelona

DURATION: 2024-2027

COORDINATOR: Cetaqua Andalusia

MORE INFORMATION: marclaimed.eu

A1.3. AWARD, alternative water resources to increase resilience to climate change

THE CHALLENGE

Due to the adverse effects of climate change and the urgent problem of water scarcity, the AWARD project aims to actively engage society, the scientific community and policymakers in informed knowledge creation and strategic water planning.

THE SOLUTION

The overall objective of AWARD, a Horizon Europe-funded project, is to provide knowledge on how to effectively integrate alternative water sources (AWR), such as urban run-off and reclaimed water, among others.

THE RESULT

Potential results include the capacity to recover up to 20 m^3 per day of run-off water and to validate its potential application within the uses of the Santiago de Compostela industrial park.

Legislative barriers and heritage requiring preservation in the case study will also be analysed. Finally, an interactive tool will be developed to spread the knowledge generated to all stakeholders.

"The AWARD project is essential in the region because it will provide Santiago de Compostela with alternative water resources to strengthen its resilience to climate change through nature-based solutions."

SERGIO SANTORIO Leader of the Advanced Scrubber Treatment programme and AWARD project manager

PARTNERS: Université Paris-Saclay, L'Association ePLANETe Blue, Aquanova, Eduard Interwies, Business Development Group, Aimen, Ethnicon Metsovion Polytechnion, IRIDRA, Paralimni Sewerage Board, Universitatea Tehnică de Construcții București, Città metropolotina di Milano, CAP Holding

DURATION: 2024-2027

COORDINATOR: OiEau

MORE INFORMATION: www.awardproject.eu

A1.4. ClimEmpower, climate resilience in the development of vulnerable regions

THE CHALLENGE

ClimEmpower aims to collaborate with five regions in Southern Europe that face a combination of climate risks and have low adaptive capacity for socio-economic reasons. It addresses the impact of climate change and ecological and socio-economic issues, and develops adaptation strategies to match the specific needs of the regions.

THE SOLUTION

It demonstrates the importance of climate resilience in regional development and provides valuable tools, data and knowledge to particularly vulnerable regions in Southern Europe facing these challenges.

THE RESULT

Development of a GIS (geographic information system) methodology to estimate three climate impacts: droughts, forest fires and heat waves, with the free QGIS software. An indicator has been designed and validated for the quantitative evaluation of a region's resilience to climate change: Regional Climate Resilience Assessment (CLIM-RA). Finally, the project will study the use of the European tool "CLIMAAX" and its application in risk mapping, which can be replicated at different scales to help improve knowledge.

"ClimEmpower contributes to the assessment of risks associated with climate change in Southern European countries by providing tools, data and knowledge to demonstrate the importance of climate resilience in regional development."

ISABEL GAMALLO ClimEmpower project manager

PARTNERS: Aquatec, PLINIVS, ECMWF, Government of Andalusia (OACC), OBZ, CERTH, Frederick Research Center, Regione Sicilia
DURATION: 2023-2026
COORDINATOR: Austrian Institute of Technology (AIT)
MORE INFORMATION: climempower.eu

A1.5. AI4GLACIER, snowmelt flow prediction using machine learning algorithms

THE CHALLENGE

In the Metropolitan Region of Chile, where the country's capital (Santiago) is located, most of the water supply comes from surface water. This mainly originates from rainfall and melting snow and ice in the Andes Mountains, making them an essential source of drinking water in the region and a highly vulnerable asset in the context of climate change.

THE SOLUTION

Such is the situation that a tool is required than can adequately forecast key hydrometeorological variables to guide policy and decision-making processes. The objective of this research is to develop a methodology based on machine learning models to improve predictions of flow in the Maipo and Mapocho rivers by incorporating hydrometeorological variables and selective consideration of snow cover depending on the time of year. This would improve the accuracy of flow estimation and optimise water resource management in the region.

THE RESULT

The resulting methodology captures the historical patterns of the Maipo and Mapocho rivers through hydrometeorological variables, including the capture of surface ice and snow cover in the Andes Mountains. One innovative aspect is how the influence of the El Niño phenomenon has substantially improved forecasting in periods considered as "normal" or "wet", which previously posed a problem for predictive models. The tool can therefore be applied to further enrich existing knowledge of the local water cycle and support stakeholders' decision-making.

"The possibility of including new data sources offers alternatives to strengthen predictive models, but above all, it allows us to generate more new knowledge that contributes to maximising water resilience in communities. This is why AI4GLACIER exemplifies an effort to seek greater efficiency in decision-making and water management."

LUPICINIO GARCIA AI4GLACIER project manager

PARTNERS: Aguas Andinas
DURATION: 2023-2024
COORDINATOR: Cetaqua Andalusia

Area 2. Production and new resources

A2.1. B-WaterSmart, accelerating water intelligence on Europe's coast through living labs

THE CHALLENGE

In the coming years, the European Union aims to increase water reuse sixfold and thus contribute to the UN 2030 Agenda Sustainable Development Goals. This is the purpose of B-WaterSmart, a project in the Horizon Europe programme that seeks to develop circular economy-based smart technologies for efficient water management.

THE SOLUTION

We have worked to implement several living labs, collaborative innovation spaces where government authorities, companies and end users can co-create and experiment with new solutions. In Spain, Living Lab Alicante has addressed local challenges by creating six Communities of Practice, demonstrating innovative solutions to transform wastewater treatment plants into ecofactories, capable of maximising resource recovery and energy self-sufficiency.

THE RESULT

Living Lab Alicante has helped in the validation of several technological solutions, such as:

- Energy recovery through co-digestion of sludge and other organic wastes and the use of microturbines to exploit the hydroelectric potential of effluent in the plant.
- Recovery of nutrients using CEVAP evaporative technology, exploring its feasibility for recovering the ammonium in sludge drying rejects.
- Recovery of brines through selective electrodialysis and electrochlorination, investigating their potential for converting waste streams into value-added products.

These developments have provided key insights into the challenges and opportunities of each solution, facilitating decision-making for possible larger scale implementation.

"Through Living Lab Alicante, we have validated technologies and generated essential knowledge to move towards a more sustainable and circular model in water management in our region. In addition, collaborating with other living labs in Europe has allowed us to exchange innovative approaches to address water challenges with a more global vision."

ERIC SANTOS Head of the Promoting Reuse and Other Water Resources programme and B-WaterSmart project manager

PARTNERS: Cetaqua Barcelona, Aguas de Alicante, UNED AQUAE, LNEC, SINTEF, KWR, NTNU, Adelphi, Adene, Aguas Tejo Atlantico, Aquafin, Baseform, Bodo Kommune, De Watergroep, Depuracque, DMK Group, Engineering, EnviroChemie, Eurecat, Hidrotech, Sense Group, ICS Lisboa, Krüger Kaldnes, Lisboa Camara Municipal, Mechelen, OOWV, Proefstation, Techni, Turbulent, Veritas, Vito, Water Europe

DURATION: 2020-2024

COORDINATOR: IWW

MORE INFORMATION: b-watersmart.eu

A2.2. LIFE Conquer, water reuse for irrigation in the city of Murcia

THE CHALLENGE

The region of Murcia is one of the most water-stressed regions in Europe due to its intensive agricultural activity. LIFE Conquer was created with the aim of establishing a sustainable and circular treatment that protects water resources by producing quality reused water and recovering the waste produced during the process.

THE SOLUTION

LIFE Conquer, co-funded by the European Union's LIFE programme, has developed pioneering nanofiltration technologies to produce reclaimed water that has low salinity and retains nitrates, a treatment train for the resulting brine, and an innovative electrochlorinator that transforms the brine into sodium hypochlorite (NaClO).

THE RESULT

LIFE Conquer has managed to produce and inject more than 140,000 m^3 of reclaimed water per year into the urban irrigation system in Murcia. This has led to an 8% reduction in drinking water used for this purpose, while obtaining 400 kg of sodium hypochlorite per year for self-consumption at the Zarandona water reclamation plant (Murcia).

"LIFE Conquer has helped us demonstrate a membrane technology for the production of reclaimed water that is not widely available and offers major improvements over more common systems in terms of operating costs."

SONIA MATENCIO LIFE Conquer project manager

PARTNERS: Aguas de Murcia, Aquambiente Circular Economy Solutions
DURATION: 2020-2024
COORDINATOR: Cetaqua Barcelona
MORE INFORMATION: life-conquer.eu

A2.3. REECOVERY, recovery of critical raw materials from water in the mining industry

THE CHALLENGE

Metals such as rare-earth elements, zinc, cobalt and copper are essential for developing low-carbon technologies such as those used in the production of electric cars and wind turbines. However, these are not produced in Europe.

With the aim of reducing external dependence and promoting the circular economy, the European REECOVERY project was created to recover valuable metals from water in the mining industry.

THE SOLUTION

Co-financed by the European Union's EIT RawMaterials programme, REECOVERY has developed a treatment train consisting of three units to treat contact water affected by metals in its passage through former mining areas in the Aznalcóllar mine complex, which converges and accumulates in the cut-off.

The first stage of the treatment train recovers metal sulphides of copper, cobalt and zinc, while the second stage recovers rare earth oxalates. In the third stage the water treated in the previous stages is reclaimed so that it can be reused in industrial processes.

THE RESULT

For each m^3 of water treated in the project pilot plant, more than one kilogram of sulphides of metals such as copper, cobalt and zinc, and 70 grams of rare earth oxalates, have been recovered. In addition, 70% of the water used during the different stages of the system has been reclaimed for reuse.

"The innovative technology used at REECOVERY has enabled us to obtain materials with a good enough quality to be marketed. What's more, it can be used to recover valuable materials found in the waters of other industries. Therefore, this technology has great potential."

EDXON LICON REECOVERY project manager

PARTNERS: Cetaqua Barcelona, Aquambiente Circular Economy Solutions, UPC, CSIC, IMN
DURATION: 2022-2024
COORDINATOR: Minera los Frailes
MORE INFORMATION: reecovery.eu

A2.4. RUAGUA, an innovative system for the sustainable production of reclaimed water in A Rúa

THE CHALLENGE

A Rúa (Ourense) is one of the municipalities in Galicia most affected by drought. In addition to water stress, the A Rúa region has a high risk of forest fires. More than 15% of its forest area – equivalent to 450 soccer fields – was burned between 1996 and 2015.

THE SOLUTION

RUAGUA, an innovative project that focuses on the circular economy to address water stress in this Galician municipality, arose out of this context. The project aims to provide a better use of water-energy resources and implement an innovative system for the sustainable production of reclaimed water.

THE RESULT

The potential results include an annual reclaimed water production capacity of 72,803 m^3, with 100% energy self-sufficiency for its production, and potential savings of 13% in drinking water consumption. It is also important to highlight the different sessions and dynamics organised with the local population to raise awareness of the challenges of water scarcity and promote a culture of circularity in the community.

RUAGUA is part of the DEMOS Programme, a Cotec Foundation initiative included in the Allen Plan of the IKEA company – a Cotec Advisory Member.

"RUAGUA's reclaimed water plant has achieved energy self-sufficiency, thus reaching a key milestone in the project. We are currently in the process of validating the quality of the water, with a view to initiating the administrative procedures for its use."

SERGIO SANTORIO Leader of the Advanced Wastewater Treatment Programme and RUAGUA project manager.

PARTNERS: AquaOurense, Consorcio de Aguas de Valdeorras
DURATION: 2023-2025
COORDINATOR: Cetaqua Galicia
MORE INFORMATION: cetaqua.com/proyectos-destacados/ruagua/

A2.5. P2GreeN, use of reclaimed water and digital tools for agricultural irrigation

THE CHALLENGE

The P2GreeN project, funded by the Horizon Europe programme, is being carried out in the Axarquia area (Málaga), a region where the challenges of increasingly frequent droughts together with excessive nutrient release into the environment mean that human activity has a greater impact on ecosystems.

All this means alternatives are needed that help preserve available water resources, reduce environmental impacts and contribute to creating a more sustainable circular economy system.

THE SOLUTION

The project proposes the recovery of nutrients through the use of reclaimed water for the irrigation of avocados and mangoes, using an intelligent fertigation system that provides the necessary amount of water and nutrients.

THE RESULT

P2GreeN has led to the development of an intelligent digital tool for precision agriculture and demonstrated the feasibility and safety of using reclaimed water for the irrigation of subtropical fruits.

"P2GreeN aims to bring about a paradigm shift in our current blue and linear urban infrastructures, as well as in nutrient management in agriculture, through innovative circular systems."

JOSÉ MANUEL NIETO P2GreeN project manager

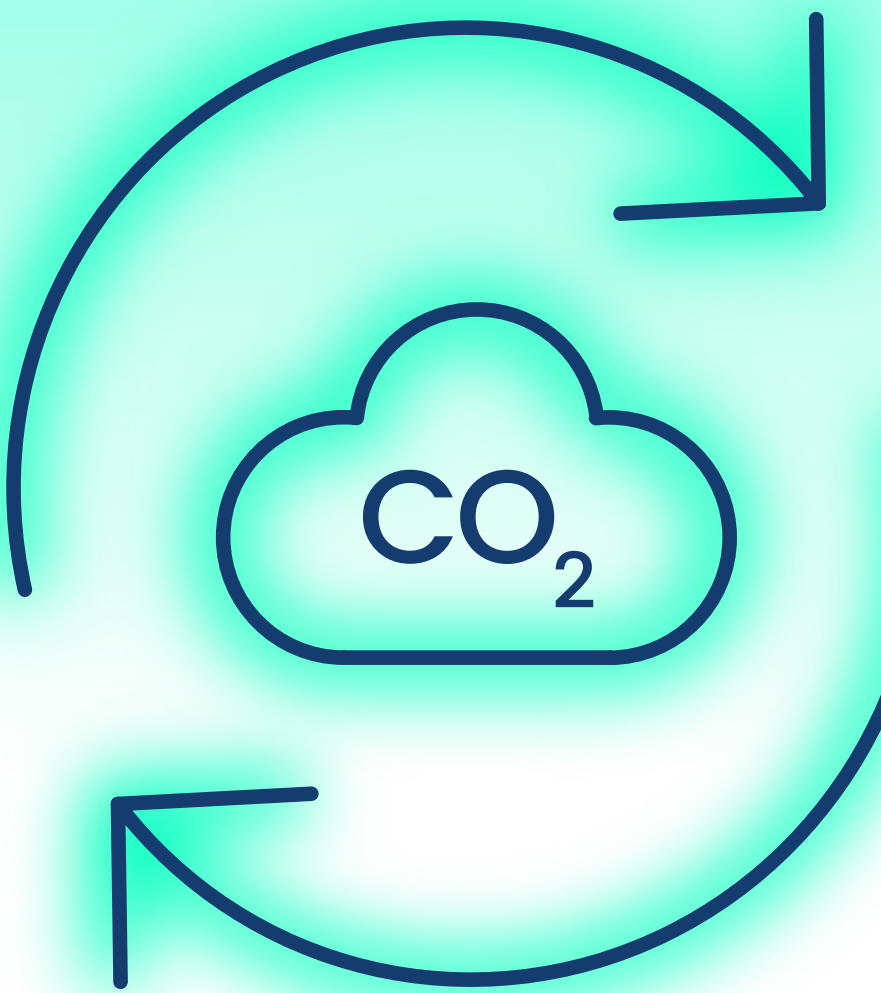
PARTNERS: agrathaer GmbH, Leibniz Institute of Vegetable and Ornamental Crops, Ville de Paris, University College Dublin, Swedish University of Agricultural Sciences, Copenhagen Business School, Natural Resources Institute Finland, National University of Ireland (Maynooth), Centre for Research and Technology Hellas CERTH, Bioazul, Citizens in Power, Goldeimer Gmbh, Institut d'arquitectura avançada de Catalunya, ICLEI EURO, Cetaqua Andalusia, Sun Global Chemical Services, IRIDRA, Ecole Nationale des Pont et Chausses, Institute for Regional Studies CERS-KRTK, HafenCity University Hamburg, SustChem Technical Consulting, Transition ApS, Triodos Bank, Moverim Consulting, Trops, Agualitycs, Touch Down AB, Sanitation360 AB, Costa del Sol-Axarquía Municial Association (AXARAGUA), Gotlands Bryggeri, VunaNexus

DURATION: 2022-2026

COORDINATOR: agrathaer GmbH

MORE INFORMATION: p2green.eu

Area 3. Zero waste and decarbonisation



A3.1. LIFE NIMBUS, circular economy for a sustainable transport system

THE CHALLENGE

The transport sector requires around 30% of total primary energy consumption in Europe, but less than 10% of the fuels used for transport are renewable. The LIFE NIMBUS project, co-financed by the European Union LIFE programme, aims to promote the circular economy for more sustainable public transport in the Barcelona metropolitan area.

THE SOLUTION

This project is developing and validating a system to produce biomethane, a sustainable and renewable fuel, from sewage sludge. It also uses power-to-gas technologies to convert surplus renewable energy into biomethane.

The biomethane produced is used as renewable fuel for a bus in the Transports Metropolitans de Barcelona (TMB) fleet, thus contributing to the transition towards greener urban transport.

THE RESULT

In 2024, the LIFE NIMBUS project started continuous biomethane production, generating up to 1.5 Nm^3/h of biomethane at 95% purity through biological methanation. This quality makes it suitable for use as a renewable fuel. The amount of biomethane produced is equivalent to the energy needed to travel more than 18,000 km a year with an urban transport bus.

"The integration of biomethanation and power-to-gas is essential to decarbonisation and the energy transition, as they enable the conversion of organic waste and surplus renewable energy into biomethane."

ALESSANDRO SOLIMENO LIFE NIMBUS project manager

PARTNERS: Aigües de Barcelona, Universitat Autònoma de Barcelona, Transports Metropolitans de Barcelona
DURATION: 2020-2025
COORDINATOR: Cetaqua Barcelona
MORE INFORMATION: www.life-nimbus.eu

A3.2. LIFE CYCLOPS, recovery of polyphenols from oil and wine industry residues

THE CHALLENGE

The olive oil production process generates a residue called ***alperujo***, which contains a high concentration of polyphenols. These are valuable antioxidant compounds due to their nutritional and technological properties. LIFE CYCLOPS seeks to technically and economically demonstrate a sustainable technology to recover these polyphenols and convert them into high-value-added products for other industries. In addition, the transferability of the solution to the wine industry will also be studied.

THE SOLUTION

LIFE CYCLOPS, co-financed by the European Union LIFE programme, has developed a treatment train consisting of an ***alperujo*** pumping system, a solid-liquid extraction stage to obtain polyphenols, a centrifugation stage for phase separation, and a membrane train to concentrate the polyphenols. The pilot project started operations in 2024 at the Borges-BAIEO facilities (Cabra, Córdoba).

THE RESULT

The LIFE CYCLOPS solution will be validated on a pilot scale at the Borges-BAIEO facilities. Large-scale application of the technology will allow 100% of the olive ***alperujo*** generated at the mill facilities to be treated. The pilot plant will then be moved to Unió Origen. At the end of the project, the plan is to implement the solution in five oil industry facilities and eight wine facilities. This represents the production of 41.8 tonnes per year of polyphenols and 57,800 and 42,400 tonnes per year of dephenolised ***alperujo*** and wine residues, suitable for co-digestion in wastewater treatment plants.

"This solution offers a circular economy and zero waste model to use these leftovers, which are difficult to manage, and turn them into high-value-added products for other industries."

RUBÉN TITOS LIFE CYCLOPS project manager

PARTNERS: Aquambiente Circular Economy Solutions, Borges-BAIEO, Unió Nuts, Unió Origen, CSIC
DURATION: 2022-2026
COORDINATOR: Cetaqua Barcelona
MORE INFORMATION:
www.cetaqua.com/proyectos-destacados/life-cyclops

A3.3. CIGAT Circular, helping decarbonise Galicia by converting waste into resources

THE CHALLENGE

The CIGAT Circular Joint Research Centre was set up in a context of climate crisis, in which sustainable and circular economy models need to be adopted to increase regional resilience and adaptability. To promote decarbonisation, CIGAT Circular, a collaboration between Viaqua and Cetaqua Galicia with funding from the Galician Innovation Agency (GAIN), is working to position Galicia as a carbon-neutral region.

THE SOLUTION

CIGAT Circular, the highest level in the Joint Research Units Programme, proposes an integrated model to convert industrial, urban, agricultural and rural waste into high-value-added resources. To this end, it works on different lines of research and innovation around four main areas: water, energy, by-products and digital.

THE RESULT

In 2024, a plant for the production and supply of reclaimed water was built at the Ourense ecofactory, AQUARGA. On a pilot scale, technologies for the production and purification of high-value-added biocomposites, ammonia recovery and phosphorus salts from urban waste streams have been validated. Likewise, green hydrogen and caproic acid technologies have been developed from agri-food industry effluents.

"CIGAT Circular has shown that the transformation of waste into high-value-added resources is a reality. The results obtained not only confirm the technical feasibility of the proposed innovative technologies, but also open the door to new opportunities and business models that drive a circular economy in the water sector."

ANTÓN SANTOS Leader of the Decarbonisation Technologies and Gas Recovery Programme and CIGAT Circular coordinator

PARTNERS: Viaqua
DURATION: 2022-2025
Coordinator: Cetaqua Galicia
MORE INFORMATION: www.umcigat.es

A3.4. Anammox, demonstration of a resilient industrial operation

THE CHALLENGE

The treatment of streams with high concentrations of nitrogen compounds poses significant challenges, especially given the high consumption of oxygen and organic matter required by the conventional nitrification-denitrification process. For this reason, more efficient alternative technologies have been explored, especially the partial nitritation-Anammox process, which represents an innovative and promising solution for the treatment of this type of water.

THE SOLUTION

The challenge is to determine the operational conditions to achieve greater operational resilience in the Anammox process at the Mapocho-Trebal biofactory (Chile). To this end, the short-term objective is to identify more robust process control setpoints. The medium-term objective is to develop a new configuration of the Cyclor-Demon process in which the partial nitritation stage is carried out in the unit prior to the Anammox process, in order to control nitrite formation and determine the feasibility of generating a large part of the nitritation in the previous stage of biological carbonaceous fraction removal.

THE RESULT

Kinetic studies with Anammox biomass from the Mapocho-Trebal biofactory have shown that at a concentration of 14 mgN-NO_2-/L, half the maximum specific experimental activity is achieved. The inhibitory concentration of nitrite in the short term is 82 mgN-NO_2-/L, while in the long term, inhibition occurs at levels as low as 30 mgN-NO_2-/L, reducing activity by around 50% within 3 HRTs in tests carried out with the biomass from the Mapocho-Trebal biofactory. However, we cannot draw conclusions from the experiments on the irreversibility of inhibition by this effect. This will have to be studied during the industrial pilot test.

"This project is key for Cetaqua Chile, as it will help develop operational strategies that drive more advanced and efficient biological processes, such as partial nitrification and Anammox."

GUSTAVO VARGAS PhD, researcher and Anammox project manager

PARTNERS: Aguas Andinas
DURATION: 2023-2025
COORDINATOR: Cetaqua Chile

Area 4. Territorial and social sustainability

A4.1. COSME Water Footprint, adaptation and validation of the methodology for calculating the water footprint in the cosmetics sector

THE CHALLENGE

COSME Water Footprint, a project co-financed by the Government of Spain Ministry of Industry and Tourism's programme to support Innovative Business Groups (AEI), arose from the lack of information and knowledge on the part of the cosmetics industry when assessing the impact of its activity on the availability and quality of water sources. The project sought to remedy this by establishing the water footprint indicator as a fundamental tool for its management.

THE SOLUTION

COSME Water Footprint has developed and validated a water and water footprint analysis methodology adapted to the cosmetics sector. Through collaboration between stakeholders and visits to the facilities of various companies in the perfumery and personal care sector, it has ensured that the results from the proposed project address the problems and needs of the industry.

THE RESULT

The project has laid the foundations for the future development of a specific digital tool to calculate the water footprint of companies in the perfumery and cosmetics sector, in terms of both organisation and product. This would be the first software specifically for the sector and this purpose, making it a global innovation.

"Water is a fundamental raw material for the cosmetics industry, so understanding and improving water management will ensure access to the resource and reduce its impact on the territory."

IAGO FERREIRO Head of the Environmental Neutrality, Tourism and Circularity programme and COSME Water Footprint project manager

PARTNERS: Cetaqua Barcelona, Feeling Innovation by Stanpa, Lente Ingenieros, Hidroquimia, Hydrokemos

DURATION: 2023-2024

COORDINATOR: Catalan Water Partnership

MORE INFORMATION:
cwp.cat/en/projectes/cosme-water-footprint-3

A4.2. FER-PLAY, evaluation of circular fertilisers to promote sustainable local value chains and clean ecosystems

THE CHALLENGE

Universal use of conventional fertilisers has greatly increased food production worldwide, but has also generated significant negative impacts on human health and the environment, such as water pollution, loss of biodiversity, eutrophication and greenhouse gas emissions. For this reason, seeking and developing alternatives that are more sustainable and respectful of the planet and its ecosystems is essential.

THE SOLUTION

FER-PLAY is a project co-funded by the Horizon Europe programme that contributes to the adoption of circular fertilisers. Their use protects ecosystems, decreases the EU's dependence on fertiliser imports, promotes circularity and improves soil health. The project identifies and evaluates circular fertilisers made from secondary raw materials, such as manure and urban wastewater, to promote large-scale production and use in rural areas.

THE RESULT

→ Wastewater recovery, from struvite recovery to the stabilisation of treatment plant sludge, highlighting the importance of resource recovery in complete water management.

→ Development of guides and recommendations for end users, such as agricultural producers, that improve understanding of how to apply circular fertilisers, what their benefits are and why they can replace conventional fertilisers without requiring greater investment.

→ Recommendations have also been developed for government authorities, so they can develop local and regional policies favouring the use of circular fertilisers.

"FER-PLAY contributes to generating more knowledge on the potential and benefits of circular fertilisers for more sustainable European agriculture."

LUCÍA GONZÁLEZ FER-PLAY project manager

PARTNERS: CCIC, EBA, NURESYS, INAGRO, DRAXIS, REVOLVE, ACR+, COLDIRETTI, NATURLAND, ASAJA
DURATION: 2022-2025
COORDINATOR: CETENMA
MORE INFORMATION: www.fer-play.eu

A4.3. CALANDHI, regional water footprint calculation to improve water management

THE CHALLENGE

Rising demand for water due to population growth, economic development and the effects of climate change are placing available water resources under greater pressure, making efficient water management crucial.

The situation requires innovative tools and methodologies to comprehensively assess regional water footprints, identifying the main sources of pressure and opportunities for improvement.

THE SOLUTION

CALANDHI aims to develop and implement a methodological framework for evaluating the regional water footprint (including its validation), thereby introducing the indicator as a regional management tool to help improve HIDRALIA's water management processes. The aim is to reduce pressure on water resources and ensure their long-term sustainability.

THE RESULT

The project will develop both a model for calculating the regional water footprint (manual) and a calculation engine that allows semi-automation of these calculations. The project currently has several case studies running in the Western Costa del Sol (Málaga) and Western Almería, both regions with a strong tourism sector and a considerable impact on available resources.

The results will be reflected in a web viewer to consult the regional water footprint, in terms of both quantity and spatial distribution.

"The CALANDHI project will mark an advance in methodology, as it aims to semi-automate the evaluation process using a calculation engine that integrates all the data."

JOSÉ MANUEL NIETO CALANDHI project manager

PARTNERS: COVAP, Cetaqua Galicia, Cetaqua Andalusia, UGR, UCO
DURATION: 2024-2025
COORDINATOR: Hidralia

A4.4. Big Social Sur, big data for detecting social inequalities

THE CHALLENGE

The Big Social Sur project arose in the context of growing social inequality. It is an initiative that gets local social agents involved in detecting possible situations of social vulnerability and addressing them jointly. The main challenge is to provide continuity for the people-centred city model, promoting intersector collaboration while also taking advantage of the operator's data to generate new metrics to drive social transformation in the territory.

THE SOLUTION

Big Social Sur aims to carry out and apply a demographic segmentation methodology through the analysis of public data, data provided by local organisations and aggregate data on the operator's customers, such as social tariffs and consumption.

THE RESULT

The project seeks to use the potential of big data to offer a dynamic and disaggregated view of the region, based on social vulnerability parameters. Through interactive maps, the socio-economic status of each area and available social care resources can be identified, thus facilitating more effective intervention with users and more strategic decision-making in terms of social welfare. This approach helps to consolidate the social-water alliance and establish a collaborative framework among key stakeholders in the region, strengthening the joint response to social challenges.

"Big Social Sur is an initiative that promotes collaborative spaces of collective knowledge to address social challenges through dynamic visualisation maps."

AINHOA QUINA, Big Social Sur project manager

PARTNERS: Hidralia, Emasagra
DURATION: 2024-2025
COORDINATOR: Cetaqua Andalusia

Area 5. Digital services and AI applications

A5.1. TransmitWater, a technological solution for the management and mitigation of pressure transients for water operators

THE CHALLENGE

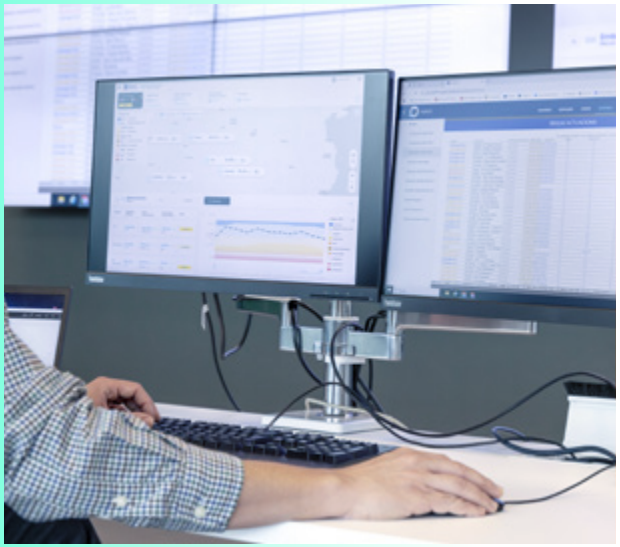
Pressure transients pose a challenge for the operation of water networks, as they produce fatigue in pipelines, leading to breaks in the long term. To predict and reduce incidents, the TransmitWater project was started, financed by the Ministry of Science, Innovation and Universities and NextGenerationEU funds.

THE SOLUTION

TransmitWater is working on the development of a decision support system (DSS), based on information from sensors in one of the most important drinking water transport systems in the metropolitan area of the city of Barcelona, along with distribution sector case studies, machine learning and other input data from the network.

THE RESULT

The tool will help water service operators detect areas with the highest probability of breaks, due to frequent pressure variations in sectors of the network, and to evaluate the most appropriate measures to reduce them. This will help in moving towards a more efficient network operation by reducing water losses, breaks and service interruptions.



"Thanks to this project, operators will obtain the information they need to establish which network sections are most likely to suffer pressure transient incidents in the future, and estimate the number of possible incidents in those sections. This will allow them to take actions to minimise the risk and thus better manage their assets."

FRANCO CRIVELLO TransmitWater project manager

PARTNERS: Cetaqua Barcelona, Aigües de Barcelona
DURATION: 2023-2026
COORDINATOR: Aquatec
MORE INFORMATION:
www.cetaqua.com/proyectos/transmiwater

A5.2. HAGRO, development of a digital tool for creating risk management models for reclaimed water

THE CHALLENGE

Andalusia, a world leader in olive oil production, is facing increasing water-related challenges due to scarcity. In this context, the HAGRO project promotes the sustainable development of Andalusian olive groves through the use of reclaimed water.

From now to 2027, the use of reclaimed water will triple in Andalusia and will thus play a fundamental role in the water mix of coastal basins, where its application has the greatest potential. All government authorities have regulatory frameworks favourable to the application of reclaimed water in irrigation as a paradigm of the circular economy and a strategy against climate change. However, this water is strictly regulated in terms of quality, and a regulatory management plan for the risks associated with its use is required.

THE SOLUTION

Designing and building a digital tool to create a risk management model for the efficient, safe and viable use of reclaimed water in olive irrigation, in compliance with European regulations.

THE RESULT

Work is under way on a software application that allows farmers to assess and manage the risks associated with the use of reclaimed water, generating confidence in the use of this resource and thus facilitating its implementation, promoting the circular economy in the olive sector.

“The HAGRO project has a consortium behind it that brings together all the necessary stakeholders to develop and implement risk management plans for the use of reclaimed water in olive grove irrigation.”

ÁNGEL CAÑETE Head of the Environmental, Climate and Agricultural Intelligence programme and HAGRO project manager

PARTNERS: Agbar Agriculture, FERAGUA, AMAYA, UCO, Cetaqua Andalusia
DURATION: 2024-2025
COORDINATOR: FERAGUA
MORE INFORMATION: hagro.es

A5.3. WATERVERSE, a water data management ecosystem

THE CHALLENGE

The WATERVERSE project, co-financed by the Horizon Europe programme, seeks to design and deploy a Data Space for the water sector that facilitates the sharing of quality data between the different stakeholders in the water cycle, guaranteeing security, privacy and accessibility. This will improve their usability and the interoperability of intensive processes, thus reducing the barrier to entry into the Data Spaces.

THE SOLUTION

WATERVERSE will be demonstrated in the Western Costa del Sol and in five other locations (Cyprus, Germany, the Netherlands, Finland and the United Kingdom), establishing clear and measurable indicators to assess data equity in water-related spaces and ensuring the viability and sustainability of the ecosystem, as well as its replicability, scalability and business applicability. In this demonstration phase, public-private partnerships and the participation of start-ups and technology SMEs will be encouraged through open participation forums, to accelerate innovation in water management through the use of open data and emerging technologies.

THE RESULT

The WATERVERSE pilot scheme in the Western Costa del Sol will contribute to reducing barriers to data availability and ensuring data quality, thus facilitating the development of AI-based solutions through new research projects, optimisation of water management and collaboration between institutions.

"In the data revolution era, interoperability and data quality are not just technical details, they essential pillars to ensure data can deliver robust and reliable results and indicators, ensuring that the planet's most precious resource, water, continues to reach our homes with the highest standards."

SERGI BAENA Head of the Smart Metering and Revenue Assurance programme and WATERVERSE project manager

PARTNERS: Cetaqua Barcelona and Andalusia, Eurecat, KWR, VTT, Engineering Group, PHOEBE Research and Innovation, EGM, Water Europe, FIWARE Foundation, PWN, Hidralia, Keypro, EOA Lemesos, HST Systemtechnik, University of Exeter, South West Water
DURATION: 2022-2025
Coordinator: CERTH
MORE INFORMATION: waterverse.eu

A5.4. DM Costa del Sol, an interactive platform for generating new meter-based indicators

THE CHALLENGE

The main objective of this project is to develop a digital solution to estimate the floating population, using AI models and customer meter data. For this purpose, in order to facilitate data management and analysis, a data ingestion process for smart metering in Estepona and Marbella is being carried out, in a database hosted on a Hidralia server. This process will allow analysis and exploitation of the collected data, in order to evaluate its quality and use it to create AI-based models.

THE SOLUTION

An interactive dashboard is being developed, with graphs, views and detailed performance reports, providing operators with an alternative view of the data to facilitate decision-making.

THE RESULT

The required infrastructure for the collection and storage of data from both remote and non-remote meters has been implemented. An algorithm to estimate the floating population from these data has also been developed. All the information is displayed in a dashboard that allows users to consult the data and generate new metrics.

"This project is laying the groundwork to make data accessible and offers the possibility of generating new value-added indicators."

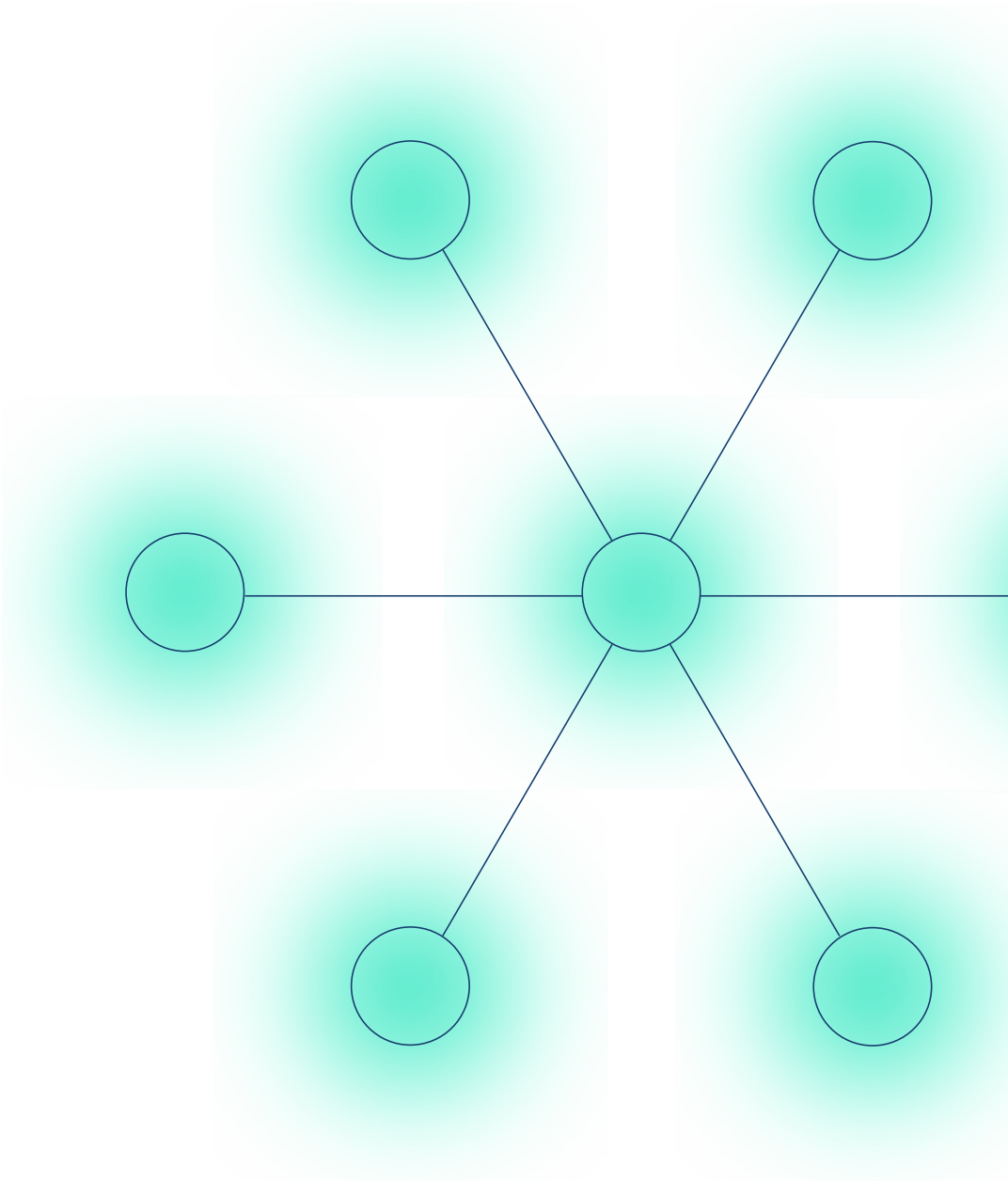
DAVID AGUILERA DM Costa del Sol project manager

PARTNERS: Hidralia, Aguas de Benahavís
DURATION: 2024-2025
COORDINATOR: Cetaqua Andalusia

07

Results transfer

7.1. Accessible knowledge



At Cetaqua, we consider it essential that the knowledge our activity and expertise generate has a real and transformative impact, adding economic, environmental and social value. To this end, we share the results of our research through the most effective channels for bringing them closer to society and communities aligned with our values, objectives and mission.

7.2. Sharing results with our ecosystem in online and offline technical meetings

We organise webinars and scientific meetings to disseminate the progress and results from the innovation projects we lead or collaborate with. These initiatives bring together professionals and key players from various sectors, including academia, public institutions and the business world. Our goal is to create an ecosystem of excellence that accelerates knowledge transfer, stimulates new ideas, promotes debate and fosters cross-sector collaboration.

17
Cetaqua webinars organised

61
Cetaqua meetings with partners and stakeholders

7.3. Participation in strategic congresses for the future of water

In addition, we actively participate in scientific and technological congresses, conferences and seminars to share the progress in our research with experts in the water, technology and environment sector, as well as with audiences interested in our areas of specialisation.

Digital Water Summit 2024

We participated in the international IWA Digital Water Summit, organised by the International Water Association (IWA), to share advances on digital twins and AI applied to the water distribution network with the Lab Digital Twins and Lab Computer Vision projects, developed in conjunction with Aigües de Barcelona.

Progress in Biogas VI

At the Progress in Biogas VI congress, organised by IBBK Biogas, we presented projects coordinated by Cetaqua, in collaboration with Aigües de Barcelona, related to biomethane, such as LIFE NIMBUS and SEMPRE-BIO, based on the generation of sustainable energy from waste.

24th SEQA Meeting

We participated in the 24th Meeting of the Spanish Society of Analytical Chemistry (SEQA) to present the LIFE CYCLOPS project, which seeks to recover waste from the olive oil and wine industry through the extraction of high-value-added compounds such as polyphenols.

27 active contributions at congresses and conferences

7.4. Specialised publications

15 publications in technical and scientific journals

We publish our progress and results in prestigious peer-reviewed and specialised journals. This not only enhances the value of our work, but also positions us as a national and international benchmark in science and technology, demonstrating our experience in our main lines of research.

Throughout 2024, we actively contributed to spreading scientific and technical knowledge with the publication of a total of 15 articles. Of these, six were scientific papers published in peer-reviewed journals, and nine were technical articles published in specialised media. The articles covered key topics such as the water cycle, digitisation, environmental sustainability and ecological transition, chemical engineering and health.

Among the most notable publications were articles in prestigious scientific journals such as the *Journal of Environmental Management*, Science of The Total Environment, the *Journal of Water Process Engineering, Biomass & Bioenergy* and Climate, among others. They also included collaborations in leading technical media such as TecnoAqua, RETEMA and IndustriAmbiente.

What does it take to renature cities? An expert-based analysis of barriers and strategies for the implementation of nature-based solutions

Joana A.C. Castellar, Lucia Alexandra Popartan, Bernhard Pucher, Rocío Pineda-Martos, Katharina Hecht, Evina Katsou, Chrysanthi Elisabeth Nika, Ranka Junge, Günter Langergraber, Nataša Atanasova, Joaquim Comas, Hèctor Monclús, Josep Pueyo-Ros.

Volume 354, March 2024, 120385

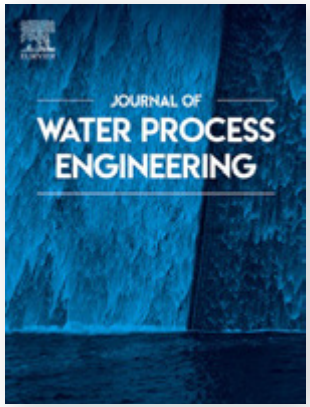
→ Read article

Scale-up and economic assessment of volatile fatty acids production from food waste

Ander Castro-Fernandez, Leticia Rodríguez-Hernández, C.M. Castro-Barros, Juan M. Lema, Anton Taboada-Santos.

Volume 182, March 2024, 107112

→ Read article



Turning fish canning wastewater into resources: Effluents and operational conditions selection for volatile fatty acids production

Tamara Casero-Díaz, Celia Castro-Barros, Antón Taboada-Santos, Leticia Rodríguez-Hernández, Miguel Mauricio-Iglesias, Marta Carballa.

Volume 64, July 2024, 105738

→ Read article

7.5. Recognition for our innovative projects

go!ODS Award, promoted by the Spanish Global Compact Network and the Rafael del Pino Foundation, for the REGREEN project, developed in conjunction with Aigües de Barcelona, for its contribution to SDG 11 (sustainable cities and communities) by promoting the use of reclaimed water for hydroponic agriculture in urban environments.

Winners of the Open Call challenge (CV+i Tourism Day) and award for the best technological solution based on the use of AI and analysis of water consumption data to identify unregistered tourist accommodation. Recognition from the Generalitat Valenciana Department of Innovation, Industry, Trade and Tourism.

Granting of the Isaac Perales Foundation award for the innovative project of the year to the LIFE Conquer project, which studies an innovative smart nanofiltration technology that allows water to be recovered for urban irrigation.

3

awards received

7.6. Driving innovation: promoting STEM education

Cetaqua is committed to bringing the areas of science, technology, engineering and mathematics (STEM) closer to the new generations, as we are convinced that intergenerational dialogue is essential to inspiring and building a society with a greater capacity for innovation and commitment to the future.

In 2024, we renewed our commitment to this objective by participating in the **100tífiques** initiative, organised by the Catalan Foundation for Research and Innovation (FCRI) and the Barcelona Institute of Science and Technology (BIST), with the support of the Generalitat de Catalunya Ministry of Education.

As part of this action, Cetaqua professionals visited different schools to share their experience with students, encourage scientific careers and convey a message of empowerment, especially to girls, who still represent a low percentage of students pursuing these technical careers. With each meeting we contribute to a future in which new generations work to drive a society where there is more innovation, more science, technology and digitisation, to the benefit of people, together with more equitable and sustainable development.

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